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QRF-0600
ZigBee Module
User Manual
(Preliminary)

Doc. #: AN-QRF-0600-01

<Rev. 0.2>

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Revision History

Version	Description of Change	Editor	Date
0.1	Initial version	Liwei	2010/12/21
0.2	Add Sleep Power	Liwei	2011/02/01

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1. GENERAL INFORMATION

The QRF-0600 module is a high output power (over 18dBm at antenna output) system that integrates RF IC, PA, LNA antenna, other necessary components such as crystal, switches, resistors and capacitors. The purpose of the QRF-0600 module is to provide our customers a flexible and reliable module for their application development. There are two interfaces for the QRF-0600 module. It's simple and convenient to program for both 802.15.4 and ZIGBEE applications.

UZ2400D, 802.15.4 compliant transceiver, features a maximum 5 MHz serial interface when operating at 20MHz for various control purposes and it is a serial interface slave device. The basic serial interface consists of 4-wired bus: SCLK, SI, SO, and SEN. It provides accesses to various storage units: MAC/BB/RF control/status registers, TXFIFOs, RXFIFO and security key table.

2. PCBA PICTURES AND MECHANICAL DRAWING

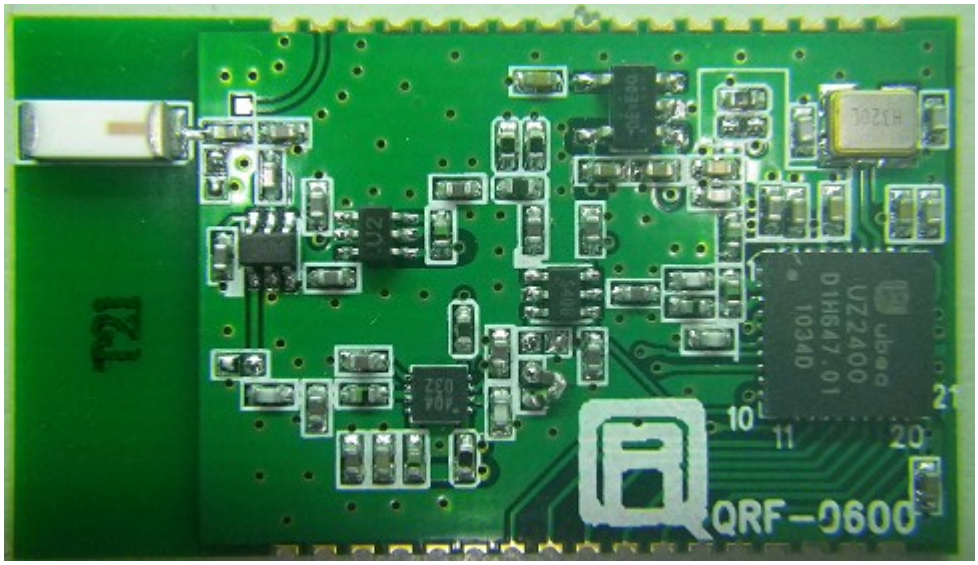


Figure 1 Front view of QRF-0600 Module

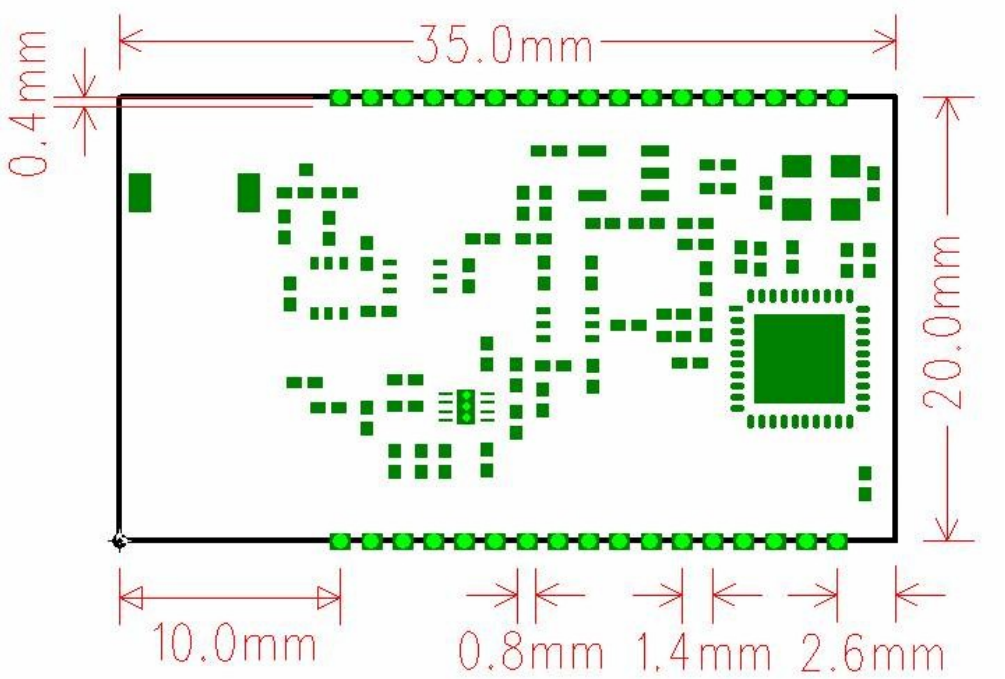


Figure 2 PCB mechanical drawing of QRF-0600 Module (front view)

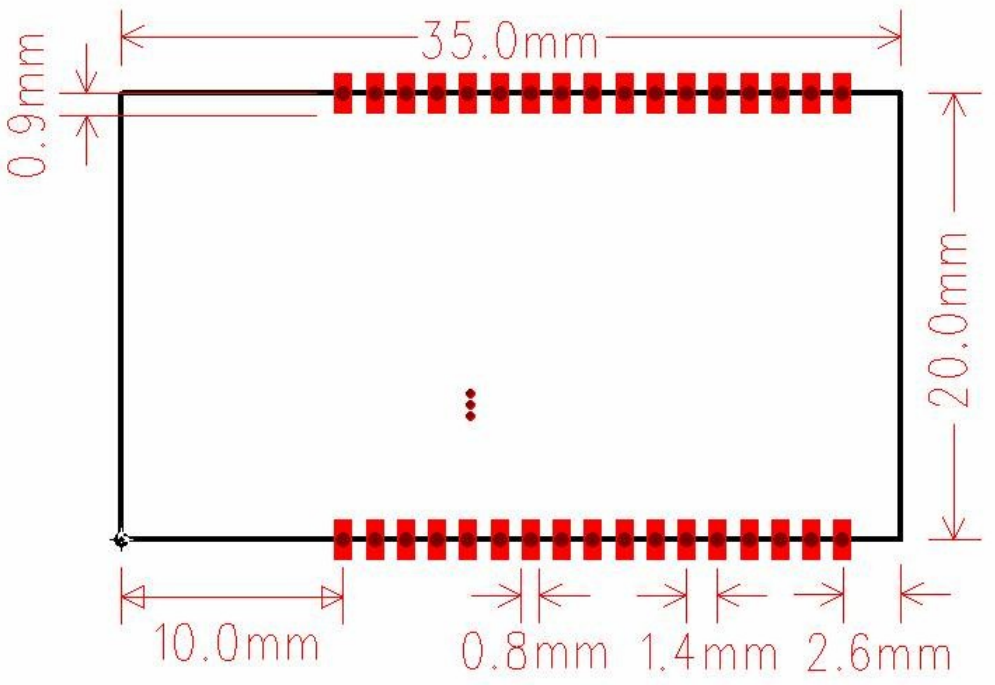


Figure 3 PCB mechanical drawing of QRF-0600 Module (Back view)

Note 1: The PCB size is 35 x 20 (cm2).

Note 2: The PCBA thickness is 2.2 mm (the highest component)

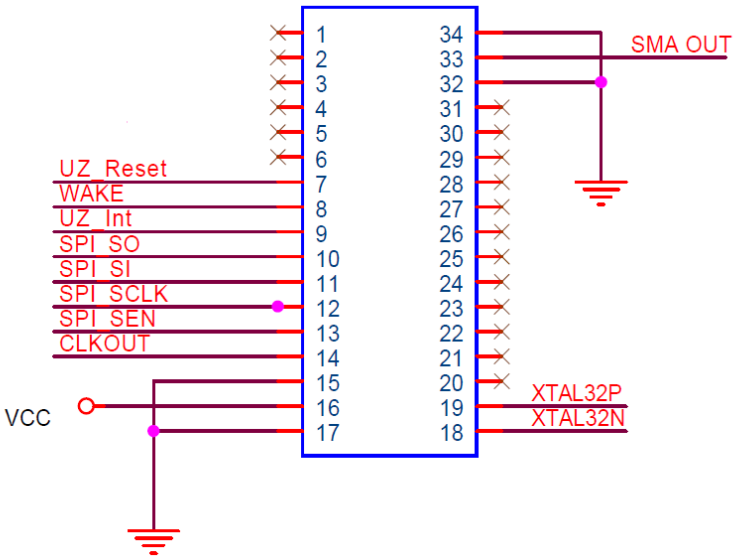
3. ANTENNA

This module adopts chip-antenna for minimizing the PCB size. User owns the flexibility to use an external antenna. When user uses external antenna, please re-solder from internal chip antenna side to external SMA (TP1).

4. POWER SUPPLY

Pad 16 is VCC input on QRF-0600 QuadRep ZigBee module. The voltage range is from 3.0V to 3.3V

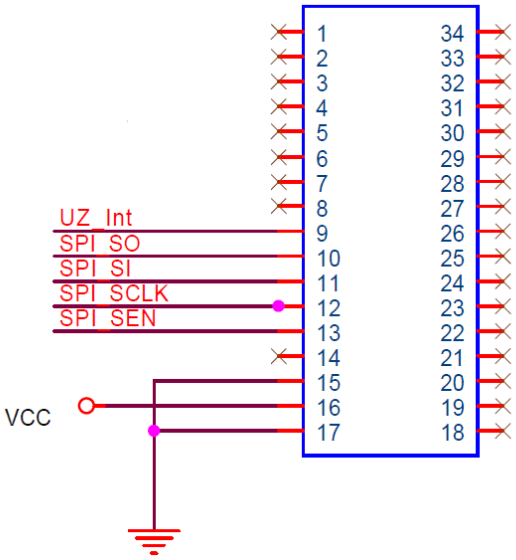
5. QRF-0600 PAD DEFINITION



Pad number	Name	Function	Definition
1	**None**	**Don't use**	
2	**None**	**Don't use**	
3	**None**	**Don't use**	
4	**None**	**Don't use**	
5	**None**	**Don't use**	
6	**None**	**Don't use**	
7	**UZ-Reset**	**UZ2400D Reset**	**UZ2400D PIN 13**
8	**Wake**	**UZ2400D Wake**	**UZ2400D PIN 15**
9	**UZ-Int**	**UZ2400D Interrupt**	**UZ2400D PIN 16**
10	**SPI_SO**	**UZ2400D SPI SO**	**UZ2400D PIN 17**
11	**SPI_SI**	**UZ2400D SPI SI**	**UZ2400D PIN 18**
12	**SPI_SCLK**	**UZ2400D SPI CLK**	**UZ2400D PIN 19**
13	**SPI_SEN**	**UZ2400D SPI SEN**	**UZ2400D PIN 20**
14	**CLKOUT**	**UZ2400D Clock out**	**UZ2400D PIN 26**
15	**GND**	**Grand**	
16	**VCC**	**Power in**	
17	**GND**	**Grand**	
18	**XTAL32N**	**UZ2400D Extra** Oscillators	**UZ2400D PIN 27**
19	**XTAL32P**	**UZ2400D Extra** Oscillators	**UZ2400D PIN 28**
20	**None**	**Don't use**	
21	**None**	**Don't use**	
22	**None**	**Don't use**	
23	**None**	**Don't use**	
24	**None**	**Don't use**	
25	**None**	**Don't use**	

26	**None**	**Don't use**	
27	**None**	**Don't use**	
28	**None**	**Don't use**	
29	**None**	**Don't use**	
30	**None**	**Don't use**	
31	**None**	**Don't use**	
32	**GND**	**Grand**	
33	**SMA OUT**	**Extra Antenna**	**SMA connect pad**
34	**GND**	**Grand**	

At least connect external lines for QRF-0600 module



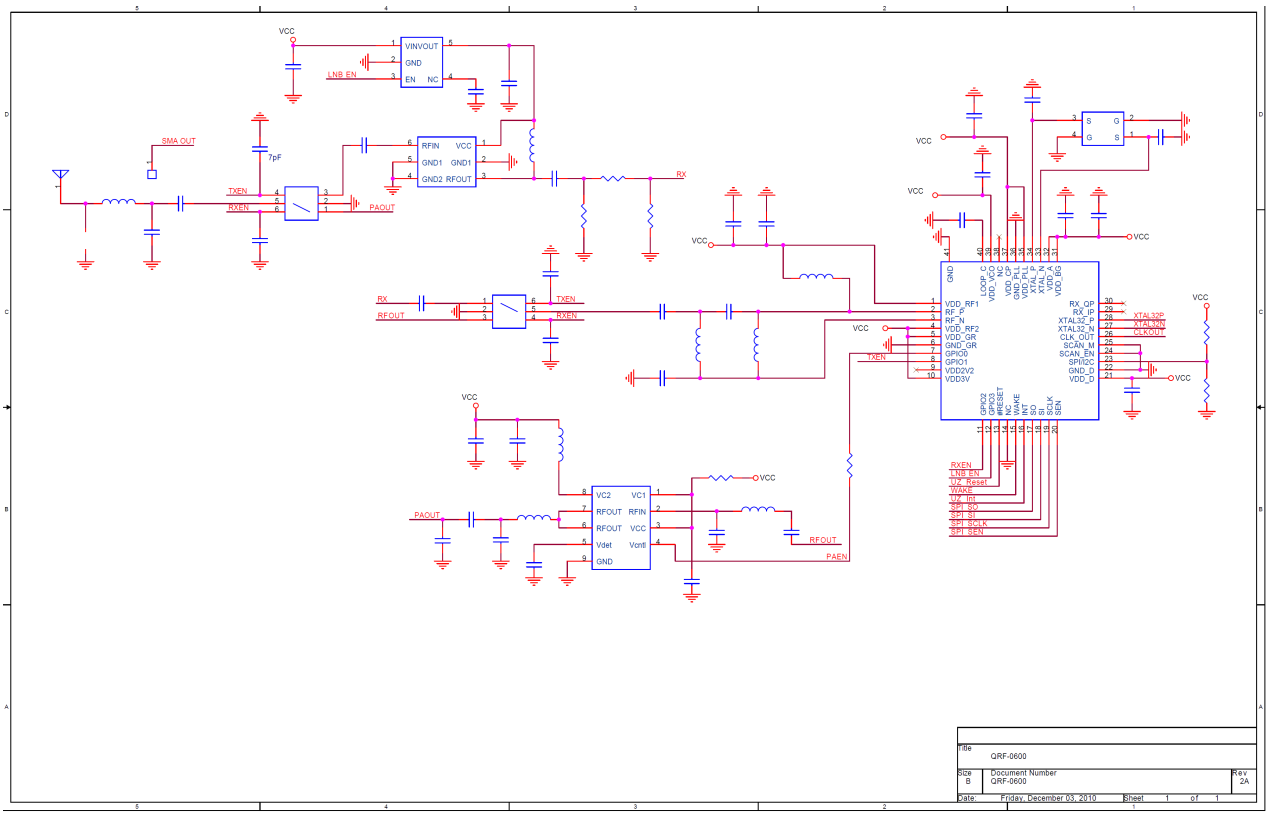
6. ELECTRICAL SPECIFICATIONS

Absolute Maximum Rating	
VCC	3.6V
Storage temperature	-40°C to +120°C
Operating temperature Range	-30°C to +80°C

WARNING: Exceeding any of these ratings will void the warranty and may damage the device

Parameters	Min	Typ	Max	Units
Supply Voltage for RF, analog and digital circuits	3	3.3	3.6	V
Supply Voltage for Digital I/O	3	3.3	3.6	V
Current Consumption				
ACTIVE TX Mode @ 18 dBm		76		mA
ACTIVE RX Mode		40		mA
Sleep Mode		1.8		mA
Output Power		18		dBm
Wireless Receive Sensitivity		-102		dBm
Selectable Channels		16		channel
Frequency Band	2.400		2.835	GHz
Antenna Output Impedance		50		Ohms

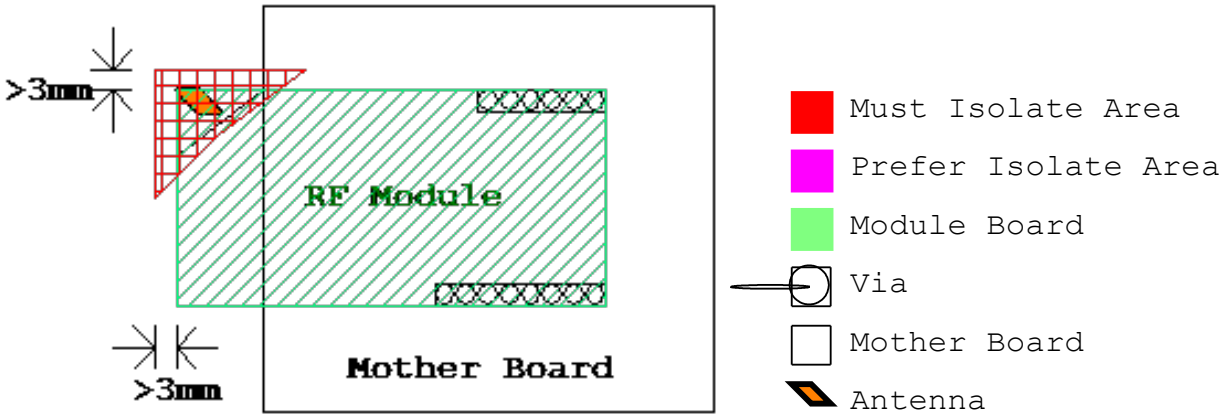
7. CIRCUIT DIAGRAM



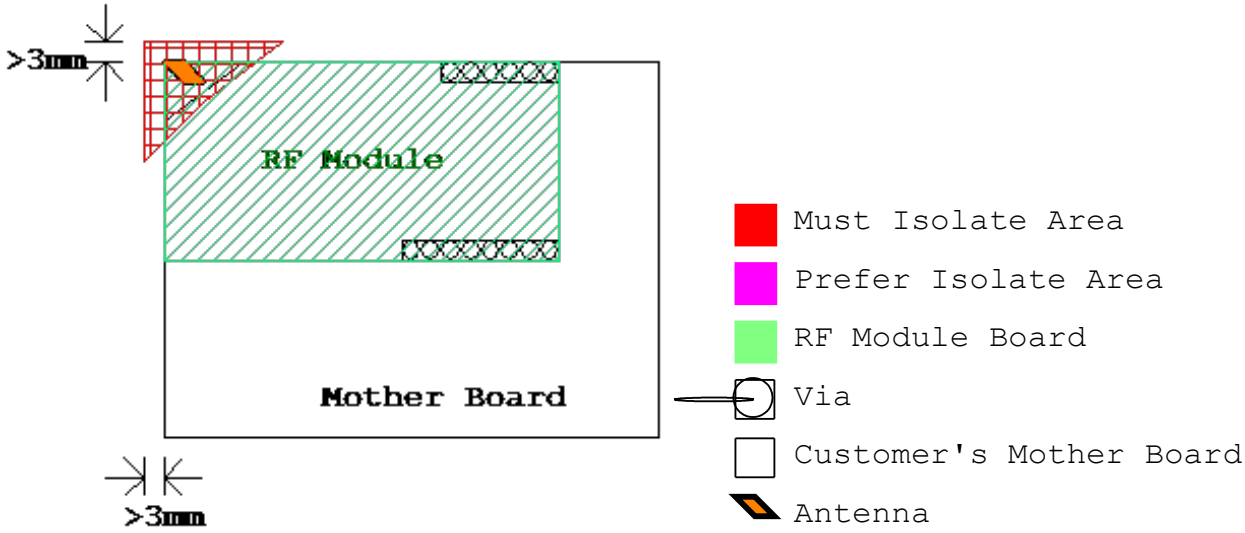
8. DESIGN GUIDE TO AVOID RF INTERFERENCE

When RF module put on an application board (mother board), to minimize the RF signal interference, the best way is to define an isolation area. This area should have no any trace or grounding pad. Here are some layout suggestions for mother board.

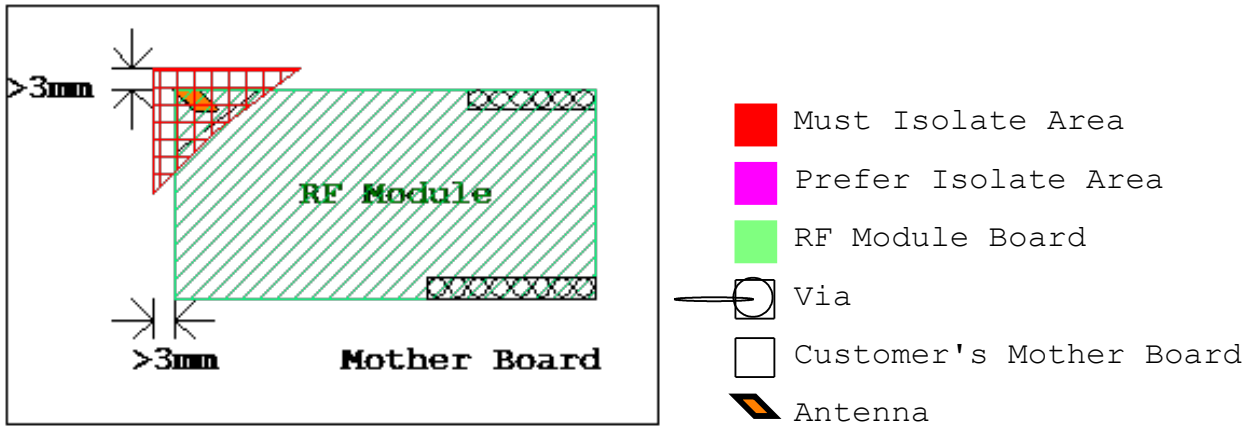
Suggestion 1: Place RF board aside mother board. (Let antenna part outside mother board is better) Make sure no trace and grounding pad under the must isolate area. Please see the drawing as below.



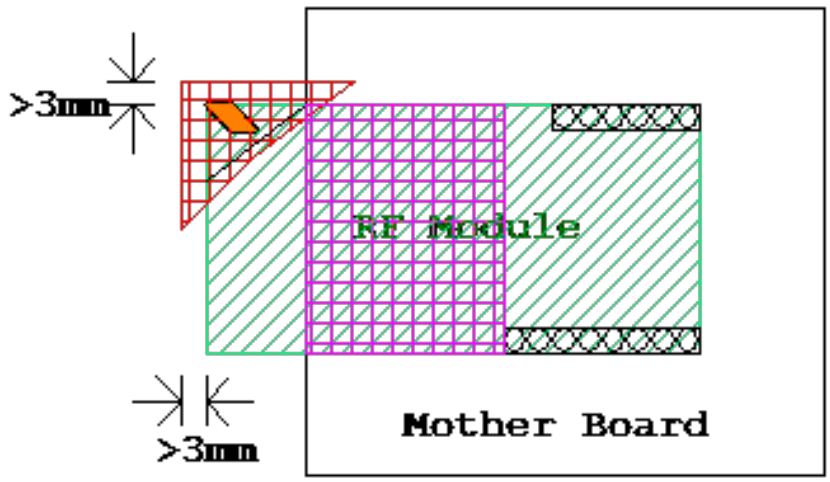
Suggestion 2: Place RF board at the corner of mother board. Make sure no trace and grounding pad under the must isolate area. Please see the drawing as below.



Suggestion 3: If you couldn't put RF board at one side or at the corner of mother board. You must make sure no circuit trace and grounding pad under the must isolate area, and at least reserve extra 3 mm space as safety area. Please see the drawing as below.



For all of above suggestions, try to extend isolation area from must area to prefer area. Please see the drawing as below. The more isolation area, the better RF performance。



Must Isolate Area

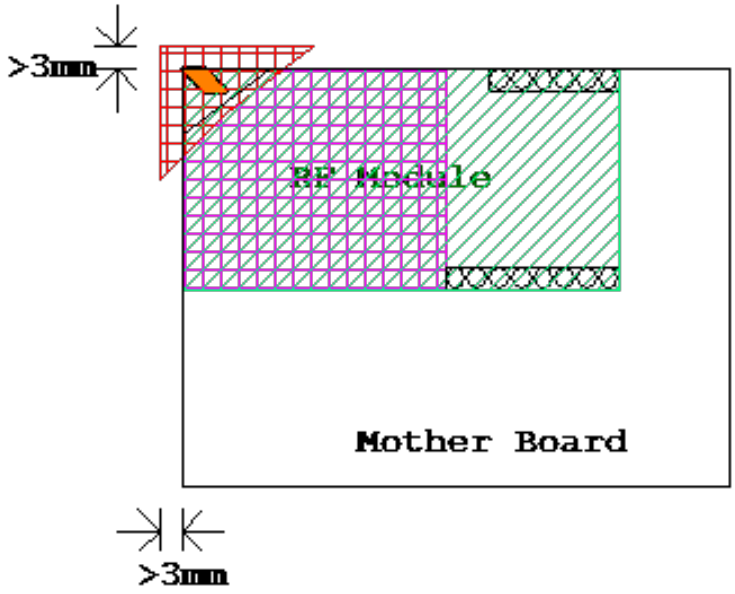
Prefer Isolate Area

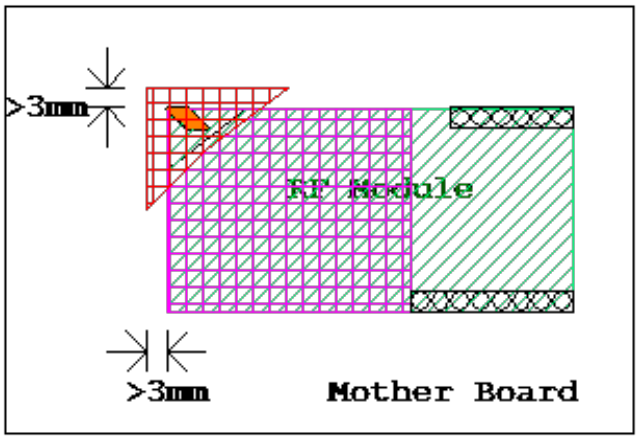
RF Module Board

Via

Customer's Mother Board

Antenna





Must Isolate Area

Prefer Isolate Area

RF Module Board

Via

Customer's Mother Board

Antenna

9. MAX RF POWER

The power amplifier is designed for the little single. The default power of UZ2400D (0 dBm) is too big for PA. If sending 0 dBm power into PA, it causes non-linearity gain and EVM become bigger.

For linearity gain and good EVM of PA, the maximum input power of PA is -2 dBm. So you should reduce the output power of UZ2400D 2 dBm.

10. REFERENCE DOCUMENTS

10.1 UBEC UZ2400D datasheet
10.2 ACX AT5020 datasheet

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